

Breeding ozone-tolerant crops

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U.S. Department of Agriculture (USDA) scientists working with the University of Illinois at Urbana-Champaign found that future levels of ground-level ozone could reduce soybean yields by an average 23 percent.

Randy Nelson, geneticist and research leader with the USDA Agricultural Research Service Soybean/Maize Germplasm, Pathology, and Genetics Research Unit in Urbana, Ill., and Lisa Ainsworth, a [molecular biologist](#) with the ARS Global Change and Photosynthesis Research Unit in Urbana, are screening soybean varieties for ozone tolerance and sensitivity in SoyFACE (Soybean Free Air Concentration Enrichment) experiments. They are working with Amy Betzelberger, a graduate research assistant in the Department of [Plant Biology](#) at the University of Illinois, and other University of Illinois colleagues.

ARS is USDA's principal intramural scientific research agency.

SoyFACE involves testing plants in open-air field conditions under atmospheric conditions predicted for the year 2050. At that time, ozone concentrations are expected to be 50 percent higher than today's concentrations.

During 2007 and 2008, Nelson, Ainsworth, Betzelberger and their colleagues tested 10 Midwestern soybean varieties that had been released between 1952 and 2003. The varieties were selected from initial tests of 22 cultivars and experimental lines evaluated for four years.

The researchers found that exposure to 82 parts per billion (ppb) ozone reduced [soybean yields](#) by an average 23 percent across all 10 varieties. They also found significant differences in ozone tolerance among the varieties. This shows the potential for breeding more ozone-tolerant varieties.

Since [ozone concentrations](#) have been rising for decades, the scientists initially thought that varieties developed more recently would be more ozone-tolerant. But the scientists didn't see any significant improvement in ozone tolerance in soybean varieties released since the 1980s.

More information: This research is described in the journal *Plant, Cell and Environment*.

Provided by United States Department of Agriculture

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